

REMARKS

Claims 2, 3, 8 and 9 are pending in this application, of which claims 2, 3 and 8 have been amended. Claims 1, 4-7 and 10 have been canceled. No new claims have been added.

Claim 3 stands rejected under 35 U.S.C. § 112, second paragraph, as indefinite.

Accordingly, claim 3 has been amended to correct the noted instance of indefiniteness

Thus, the 35 U.S.C. § 112, second paragraph, rejection should be withdrawn.

Claims 2, 3, 8 and 9 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Japanese Patent Application 54-060366 to Sugahara (hereafter, “Sugahara”).

Applicants respectfully traverse this rejection.

Sugahara discloses a simultaneous molding method for dissimilar materials. An expand-molded product is obtained by filling materials in expandable thermoplastic resin particles into the mold cavity of a molding die and heat-expanding said materials by a heating medium, such as steam, etc. The boundary part of the mold cavity that is to mold dissimilar materials is partitioned by a member that has a distance in the direction of the partition. Dissimilar materials are respectively filled into the partitioned mold cavity, and the aforementioned partitioned member is retracted from the mold cavity after filling before the completion of the heat-fusion, and the dissimilar materials are integrally fusion-molded.

The following points should be noted:

(1) Contrasts between the structure of the present invention and Sugahara.

The differences between the present invention and Sugahara will be described to be clear

with specific reference to FIGS. 3, 15, 25, 26, 28 and 29.

(i) With regard to holes of a molded article

In claim 2 of the present invention, as shown in FIG. 15, through-holes 56 are formed in a molded article. On the contrary, in Sugahara, such holes are not formed in a molded article because the teeth are retracted after filling of bead starting materials.

(ii) With regard to air orifices

In claim 2 of the present invention, air orifices 18 communicate with cavity 13 and with chambers 16 and 17 as shown in FIG. 3. Thus, it is not necessary that claim 2 includes the structure shown in FIG. 3. However, in claim 2, clearance 91 and first openings 130a and 130c shown in FIGS. 26, 28 and 29 are provided.

On the contrary, in the drawings of Sugahara, air orifices are omitted. However, as described below, it is necessary to form air orifices in molds to fill bead starting material into a cavity or to supply steam. As described below, air orifices are merely not shown in FIGS. 1 and 2 of Sugahara, but are nevertheless, still present.

(iii) With regard to through-holes of molds

In claim 2 of the present invention, teeth are fixed. Thus, through-holes through which teeth pass are not formed in the molds, as shown in FIGS. 25, 26, 28 and 29.

On the contrary, in Sugahara, as shown in FIGS. 1 and 2, a plurality of through-holes 24 for teeth are formed in the molds.

(2) Contrast between claim 2 of the present invention and Sugahara

- (i) For movability of teeth in molds as in Sugahara, many through-holes through which the teeth pass must be formed, thus the molds become complicated.

On the contrary, in claim 2 of the present invention, such through-holes are not required, so that the structure of the molds can be made simple.

- (ii) In Sugahara, an additional driving means is required so that the teeth are moveable. On the contrary, in claim 2 of the present invention, such a structure is not required, and therefore the structure of the molds can be made simpler.
- (iii) In Sugahara, during filling of bead starting materials, because of the filling pressure of bead starting materials, the teeth projecting into the mold cavity may be elastically deformed or bent, thus there may be a problem that the teeth projecting into the cavity cannot be retracted.

On the contrary, in claim 2 of the present invention, the teeth are fixed. Thus, even if the teeth are elastically deformed or bent because of the filling pressure of starting material beads, the teeth can be retracted from a molded article by parting molds.

- (iv) In Sugahara, many air orifices are formed in molds in order to exhaust air for filling starting material beads, and to supply and exhaust steam for heating and fusing of bead starting materials (although not shown in the drawings), as described below. Thus, in the surface of a molded article, marks in the molds are formed in the position corresponding to these many air orifices, and the attractive

appearance of a molded article is diminished.

On the contrary, in claim 2 of the present invention, in molding sections, air orifices are not formed at least in the molding sections for molding prominent areas of the outside face of a molded article. Thus, marks caused by air orifices formed in the prominent areas of a molded article may be prevented, and a molded article with an attractive surface can be obtained.

Furthermore, when teeth are fixed to molds as recited in claim 2 of the instant application, through-holes 56, which are shown in FIG. 15, are formed in a molded article. Thus, it is respectfully submitted that one of ordinary skill in the art can anticipate only a structure, for example, in Sugahara, in which teeth are moveable in order to prevent reduction of strength. The inventors of the present invention abandoned such an idea; actually manufactured the in-mold foam molding apparatus in which teeth are fixed; and molded many test pieces by using this apparatus to conduct tests. Then they found that sufficient strength could be obtained even though many through-holes were formed, and achieved the present invention. Therefore, it is respectfully submitted that claim 2 of the present invention is not obvious over Sugahara.

(3) With regard to air orifices

In point 4 of the Office Action, the Examiner indicates, "Since the cited reference is silent concerning air orifices, it would have been obvious to one of ordinary skill in the art to omit them from the mold apparatus, as claims 2 and 3, in order to simplify the construction of the apparatus." It is respectfully submitted that it would not have been obvious to one of ordinary skill in the art to omit air orifices completely or largely because of the following reasons.

First, in the specification of Sugahara, it is described that the volume of the mold cavity (3) is 3 L, and the volume of the mold cavity (31) is 0.3 L. When such molded article of relatively large size is molded, air orifices 18 communicating with cavity 13 via chambers 16 and 17 are essential structures as shown in FIG. 3 of the present invention.

The reason for this is that filling bead starting materials into the cavity is carried out by air transportation from the filling machine. Thus, air orifices form an essential structure in order to exhaust air which is used in the air transportation out of the cavity. Moreover, after filling bead starting materials into the cavity, steam must be supplied into the cavity through the above-mentioned air orifices and thus, by this feature, air orifices are essential. Although air orifices are not disclosed in FIGS. 1 and 2 of Sugahara, it would be obvious to one of ordinary skill in the art that air orifices 18 are provided, as shown in FIG. 3 of the present invention.

Indeed, for a molded article with a thin wall and small size such as a cup, a structure in which air orifices are completely or largely omitted from molds is proposed. In such a container having a cup shape, bead starting materials of polystyrene are generally used. These materials themselves have excellent foaming power and resin property to be easily fused, thus it is relatively easy to omit air orifices completely, and molding can be carried out by only heating the surface of molds, and attractive articles can be obtained by flowing steam from the seam portion of molds and the bottom surface of the cup to the lip portion.

However, as compared with molding a molded article of small size such as a cup, in molding a molded article of relatively large size as in the present invention and Sugahara, it is

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very difficult to completely omit air orifices.

This is because it is necessary to properly rectify and regulate air exhaust pressure of exhaust of air during filling. In conventional molds, exhaust is carried out through core vents, but it is necessary to ensure exhaust passage of air in portions except air orifices. Thus, it is very difficult to fill bead starting materials in balance in each portion of a molded article of a large size.

Moreover, during the heating process, air orifices are used for supplying steam, and as holes exhaust air remaining inside the cavity. In general, in order to fuse beads, it is necessary to replace air inside the cavity with steam. If air remains inside the cavity, the partial pressure of steam inside the cavity reduces, thus a sufficient heating temperature cannot be ensured and poor fusing is produced. Thus, it is very difficult to supply steam in balance in each portion of a molded article of a large size.

As mentioned above, it is respectfully submitted that it would not have been obvious to one of ordinary skill in the art to produce an arrangement in which air orifices are not present at least in molding sections for molding prominent areas of the outside face of a molded article, as in the present invention.

Accordingly, claims 2 and 8 have been amended to clarify this feature.

Thus, the 35 U.S.C. § 103(a) rejection should be withdrawn.

In view of the aforementioned amendments and accompanying remarks, claims 2, 3, 8 and 9, as amended, are in condition for allowance, which action, at an early date, is requested.

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If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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